

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER

205,576

U.S. APPLICATION NO. (If known, see 37 CFR 1.5

10/089629

INTERNATIONAL APPLICATION NO.
PCT/AU00/01173INTERNATIONAL FILING DATE
27 September 2000 (27.09.00)PRIORITY DATE CLAIMED
28 September 1999 (28.09.99)TITLE OF INVENTION
WRENCH

MAR 28 2002

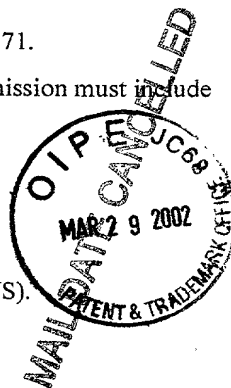
APPLICANT(S) FOR DO/EO/US PETS, Andax

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such a
 - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under I
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in com
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information: International Appln. Published - 1st page.



"EXPRESS MAIL" Label No.: ET537596810US

Date of Deposit: March 28, 2002

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37 CFR § 1.10 on the date indicated
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Trademarks, U.S. Patent and
Trademark Office.
Washington, D.C. 20231.

U.S. APPLICATION NO. (if known, see 37 CFR 1.52)

10/089629

INTERNATIONAL APPLICATION NO.
PCT/AU00/01173ATTORNEY'S DOCKET NUMBER
205,57621. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492 (a) (1)-(5)):**

Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO \$1040.00

International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO \$890.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
but all claims did not satisfy provisions of PCT Article 33(l)-(4) \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(l)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

CALCULATIONS PTO USE ONLY

\$ 1040.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	15 - 20 =	0	x \$18.00	\$ 0.00
Independent claims	2 - 3 =	0	x \$84.00	\$ 0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00	\$ 0.00
TOTAL OF ABOVE CALCULATIONS =				\$ 1040.00

☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above
are reduced by 1/2. +

\$ 520.00

SUBTOTAL =

\$ 520.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)).

\$ 0.00

TOTAL NATIONAL FEE =

\$ 520.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

\$ 0.00

TOTAL FEES ENCLOSED =

\$ 520.00

Amount to be
refunded: \$

charged: \$

a. ☒ A check in the amount of \$ 520.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 01-0035 A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card
information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR
1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Thomas E. Spath
ABELMAN FRAYNE & SCHWAB
150 east 42nd Street
New York, NY 110017-561

SIGNATURE

Thomas E. Spath

NAME

25,928

REGISTRATION NUMBER

10/089629

JC01 Rec'd PCT/PTO 28 MAR 2002 12

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : PETTS
PCT Appln. No. : PCT/AU00/01173
Filed : March 28, 2002
For : WRENCH
Examining Atty : N/A
Art Unit : N/A

ATTY DOCKET: 205,576

March 28, 2002

PRELIMINARY AMENDMENT

To the Commissioner for Patents:

Preliminary to the examination of this application, please amend the claims as follows:

Cancel claims 4 though 20, without prejudice.

Add the following new claims:

"EXPRESS MAIL" label no: ET 537 596 810 US

Date of Deposit: 28 March 2002
This correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: The Commissioner for Patents, Washington, D.C. 20231.

--21. (New) A wrench according to claim 2, wherein the handles are arranged in operative juxtaposition with each other for gripping of both handles by one hand of a user.--

--22. (New) A wrench according to claim 2, wherein the handle pivotally attached to the first jaw member is pivotable toward the other handle to tighten the grip of the gripping portions and away from the other handle to loosen the grip of the gripping portions.--

--23. (New) A wrench according to claim 2, wherein the connecting means is in pivotal engagement with at least one jaw member.--

--24. (New) A wrench according to claim 2, wherein the connecting means is length adjustable.--

--25. (New) A wrench according to claim 2, wherein the connecting means is in the form of a length adjustable nut and bolt assembly.--

--26. (New) A wrench according to claim 25, wherein the nut is in the form of a cylindrical pin having a diametral bore for receiving a length-adjustable bolt comprising a sleeve and a screw in threaded engagement with a threaded bore extending axially into the sleeve.--

--27. (New) A wrench according to claim 25, wherein the nut and bolt assembly is pivotally connected to the first jaw member and the second jaw member includes a passage for accommodating the length adjustable bolt, and permitting relative, but limited, pivoting movement of the length adjustable bolt within the passage.--

--28. (New) A wrench according to claim 27, wherein the passage is formed as a tapered bore tapering outwardly towards the first jaw member.--

--29. (New) A wrench according to claim 26, wherein the screw has a head held captive in a head retaining-cavity provided in the second jaw member, and a portion of the perimeter of the head is exposed on one or both sides of the second jaw member for manual adjustment.--

--30. (New) A wrench according to claim 2 that further comprises biasing means operatively connecting the jaw members for biasing the jaw members toward one another.--

--31. (New) A wrench according to claim 2, wherein the engagement means includes a cam in fixed relationship with the handle and co-operable with an abutment surface of the leverage portion of the second jaw member for urging the leverage portions apart.--

--32. (New) A wrench according to claim 31, wherein the cam is located close to the handle's pivotal connection to the first jaw member and is wedge-shaped along a curved axis to provide an inner curved face which is coaxial with the leverage axis.--

Remarks

All claims having multiple dependencies, or dependent from such claims, are cancelled and rewritten as new claims. Claims dependent from cancelled claims were also cancelled and rewritten in corresponding numerical order to facilitate their consideration in context. Omnibus claims 16-20 are cancelled.

The claims are cancelled without prejudice to applicant's right to further amend the claims and to enter additional dependent claims corresponding to the subject matter of the multiple dependent claims cancelled above.

Prompt entry of the this amendment and issuance of a first examination on the merits is respectfully requested.

Respectfully submitted,

ABELMAN, FRAYNE & SCHWAB
Attorneys for Applicant

By 
Thomas E. Spath
150 East 42nd Street
New York, NY 10017-5612
(212) 949-9022

-1-

WRENCHFIELD OF INVENTION

THIS INVENTION relates to a wrench.

5 The invention has particular application to an adjustable wrench of the type which has internally gripping jaws. However, it will be appreciated that the invention is not limited to this particular field of use, and may have application to other tools having movable jaws, such as bolt cutters, nut crackers, or other cutting and/or crushing tools.

BACKGROUND ART

10 Many types of wrench have been provided for gripping a mechanical element requiring application of torque for rotational movement or holding against rotation. Vise grips, for example, use a pair of jaws with multiple pivot points between the jaws together with a lever arm and over-centre locking arrangement for obtaining a tight grip on an element requiring turning. However, vise grips are sometimes difficult to remove from the article gripped and are limited in the size range of articles for which they are effective.

20 Multigrips have a wide range of size adjustments, but, for gripping an article, are limited to a simple mechanical advantage resulting from the ratio of the jaw length to the handle length, and a tight grip on the handles is required to maintain sufficient grip on the article.

25 The present invention aims to provide a wrench which alleviates one or more of the disadvantages of the prior art. Other aims and advantages may hereinafter become apparent.

-2-

DISCLOSURE OF INVENTION

With the foregoing in view, in one aspect, this invention resides broadly in a wrench including:

first and second jaw members each having first and second gripping portions for gripping an article to be rotated about a work axis and a leverage portion spaced from said gripping portion;

a handle connected to the leverage portion of the first jaw member for pivoting movement relative thereto about a leverage axis parallel to said work axis;

engagement means on said handle or operatively connected to said handle for movement therewith for engagement with the leverage portion of said second jaw member for urging said first and second leverage portions apart, and

connecting means connecting said first and second jaw members and holding them in opposed disposition, the connecting means being operatively interposed between said respective opposed gripping portions and said opposed leverage portions and being arranged to allow pivoting of one of said jaw members relative to the other, the connecting means being adjustable to vary the distance between the gripping portions to suit different sized articles.

In another aspect, the invention resides broadly in a wrench including:

first and second jaw members each having first and second gripping portions for gripping an article to be rotated about a work axis and a leverage portion spaced from said gripping portion;

-3-

a handle connected to the leverage portion of the first jaw member for pivoting movement relative thereto about a leverage axis parallel to said work axis;

engagement means on said handle or operatively connected to said handle for movement therewith for engagement with the leverage portion of said second jaw member for urging said first and second leverage portions apart;

another handle in fixed relationship to and extending from the leverage portion of the second jaw member, and

connecting means connecting said first and second jaw members and holding them in opposed disposition, the connecting means being operatively interposed between said respective opposed gripping portions and said opposed leverage portions and being arranged to allow pivoting of one of said jaw members against the other, the connecting means being adjustable in length to vary the distance between the gripping portions to suit different sized articles.

Preferably the handles are located in the plane of rotation about the work axis. More preferably, the handles are arranged in operative juxtaposition with each other for gripping of both handles by the hand of a user, and such that the handle pivotally attached to the first jaw member may be pivoted towards the other handle to tighten the grip of the gripping portions and away from the other handle to loosen the grip of the gripping portions.

The connecting means is preferably length adjustable and in a preferred form is a length adjustable nut and bolt assembly. In one preferred form, the nut is in the form of a cylindrical pin having a diametral bore for receiving a length adjustable bolt comprising a sleeve and a screw in threaded engagement with a threaded bore extending axially into the sleeve. The nut is

-4-

in pivotal co-operation with a complementary cylindrical housing provided in the jaw member for pivotal movement about an axis parallel to the work axis. It will be appreciated, however, that other shapes of nut may be provided which still provide pivotal engagement of the connecting means with the jaw member. Additionally, the wrench may be disassembled into its component parts, and in another aspect, the invention provides in the components for the wrench herein described.

Preferably, the nut and bolt assembly is pivotally connected to the first jaw member and the second jaw member includes an aperture for accommodating the length adjustable bolt, and permitting relative, but limited, pivoting movement of the length adjustable bolt within the aperture. More preferably, the aperture is in the form of a tapered bore tapering outwardly to its opening. The limiting of the pivoting may limit the amount of rolling of an article held between the respective jaw members. Preferably, the screw has a head held captive in a head retaining cavity provided in the second jaw member, and some of the perimeter of the head is exposed on one or both sides of the second jaw member for turning in a similar fashion to a thumb wheel. It is also preferred that the head retaining cavity is sized to hold the head captive with a limited degree of free movement axially with respect to the screw and also accommodate the limited degree of pivotal movement determined by the tapering bore in the second jaw member.

Preferably, biasing means is provided operatively connecting the jaw members for biasing the jaw members towards one another. More preferably, the biasing means comprises a coil spring with its respective ends engaging the respective jaw members intermediate the engagement means and the length adjustable bolt

-5-

assembly means of each jaw member respectively. Preferably, the coil spring is operatively connected to the respective jaw members.

5 The engagement means is preferably a cam in fixed relationship with the handle and co-operable with an abutment surface on the leverage portion of the second jaw member for urging the leverage portions apart. The cam is preferably located close to the handle's pivotal connection to the first jaw member. The cam is preferably wedge shaped having a section which expands along a curved axis to provide an inner curved face and an outer curved face. Preferably, the inner curved face follows an arcuate course coaxial with the leverage axis, and the outer curved face follows a part spiral course from a pointed distal end outward from the inner face until the outer curved face meets the remainder of the handle. Thus, the cam is horn shaped in section when viewed along the leverage axis.

BRIEF DESCRIPTION OF THE DRAWINGS

10 In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate two embodiments of the invention, and wherein:

Fig. 1 is a pictorial representation of a wrench according to the invention;

25 Fig. 2 is a diagrammatic sectional view of the wrench of Fig. 1;

Fig. 3 is a pictorial representation of another wrench according to the invention;

Fig. 4 is a diagrammatic sectional view of the wrench of Fig. 3;

-6-

Fig. 5 is a pictorial representation of a first jaw member of the wrenches of Figs. 1 and 3;

Fig. 6 is a pictorial representation of a second jaw member of the wrench of Fig. 1 with one handle of the wrench of Fig. 3 shown in dashed outline;

Fig. 7 is a sectional view of a length adjustable bolt assembly of the wrenches of Figs. 1 and 3;

Fig. 8 is an exploded view of the length adjustable bolt assembly of Fig. 7;

Fig. 9 is a pictorial representation of a pivoting handle of the wrenches of Figs. 1 and 3;

Fig. 10 is a partial side view of the wrench of Fig. 1 showing the jaws closed against a small article, and

Fig. 11 is a partial side view of the wrench of Fig. 1 showing the jaws closed against a large article.

DETAIL DESCRIPTION OF THE DRAWINGS

The wrench 10 illustrated in Figs. 1 and 2 has a first jaw member 11 opposed to a second jaw member 12 and linked thereto by a length adjustable bolt assembly 14. The first and second jaw members each have an arcuate gripping portion 15, each of which is opposed to the other in use. The gripping portion of the first jaw member extends from a first body portion 16 and the gripping portion of the second jaw member extends from a second body portion 17, and each of the gripping portions have a serrated or toothed insert 23 in the form of actuate inserts having axially directed teeth disposed across their respective arcuate inner faces. The first jaw member is pivotally connected to a handle 13 at a main pivot 18. The length adjustable bolt assembly is held in pivotal engagement with the first jaw member by a retaining pin 32 into which a threaded sleeve 26 is

-7-

inserted, the length adjustable bolt assembly engaging with the first and second body portions as described hereinafter. The threaded sleeve receives an adjusting screw 25. The adjusting screw has a threaded shank 27 and a disc-like head 28, the head being captive as described hereinafter in the second body portion, and a spring 19 is connected between the first and second jaw members and biased to pull the body portions of the jaw members towards each other.

The main pivot is on the other side of the retaining pin 32 from the gripping portion 15. The handle includes a cam 21 which is curved on an inner side to match the curvature of the main pivot and on an outer side is curved to form a curving wedge or horn shaped section, the outer curve of which is arranged to bear against a bearing surface 20 on the second body portion 17 of the second jaw member. The spring 19 is retained in the first and second jaw members inside a spring retaining aperture 22 in the first and second body portions, and is arranged to have a biasing force urging the body portions of the jaw members towards one another, whereas the cam and bearing surface act together to move the body portions of the jaw members apart, the relative movement between the respective body portions being pivotal by virtue of the retaining pin in the first body portion. Accordingly, part of the body portions remote from the gripping portions may be considered as leverage portions described above.

The wrench 30 illustrated in Figs. 3 and 4 has the same reference numerals for corresponding parts to the one handle wrench described with reference to Figs. 1 and 2. However, the second jaw member is provided with a second handle 29, and a first handle 24 pivotally connected to the first jaw member is in slightly different form to the handle 13 described with

-8-

reference to Figs. 1 and 2. The first and second handles each have a land 67, each land being opposed to the other and arranged to limit the closing of the handles in order to prevent injury to a user, such as pinching of a user's fingers between the handles.

Referring to Fig. 5, the first jaw member has a circular retaining pin socket 33 extending laterally therethrough and penetrating each side of the first body portion 16. In the orientation of the jaw member shown, a slotted opening 34 depends downwardly from the retaining pin socket and opens to the underside of the first jaw member, the slotted opening being segment or wedge shaped and having an arcuate orifice. A spring retaining aperture 22 also opens to the underside of the first jaw member. On the end of the first jaw member remote from the gripping portion 15, there are two circular pivot lugs 37, each of which are penetrated by a pivot pin aperture 36, the pivot lugs being spaced apart from one another on each side of a slot 38 and being parallel to the retaining pin socket.

Referring to Fig. 6, the second jaw member 12 has an adjustment sleeve aperture 42 penetrating approximately vertically through the first jaw member, and having a counterbore 43 in the lower end of the adjustment sleeve aperture, the counterbore also having an annular base 47 and a plate retaining slot 44 in its cylindrical wall for retaining a cover plate 46 close to the lower most end of the adjustment sleeve aperture 42. The counterbore and the plate retaining slot are of a diameter which is wider than the thickness of the second body portion and accordingly, the counterbore and plate retaining slot both penetrate each side of the second body portion. The adjustment sleeve aperture also has tapering sides (seen more clearly in

-9-

Figs. 2 and 4) which permit limited pivoting of the length adjustable bolt assembly therein.

The first jaw member also has a convex mating surface 35 which is an arcuate part of a circle on the lower side of the first jaw member. The convex mating surface matches in radius a concave mating surface 45 on the upper side of the second body portion of the second jaw member 12. The second jaw member 12 also includes the bearing surface 20 which, as can be seen from Fig. 6 is arcuate in form, being a portion of a circle in cross section, the bearing surface being provided on the end of the second body portion remote from the gripping portion 15. The cover plate is preferably an interference fit in the plate retaining slot and formed to be removable therefrom so that, if required, the wrench may be dismantled.

The length adjustable bolt assembly 14 is shown assembled in Fig. 7 and its three main parts are shown in Fig. 8 in exploded view. The threaded sleeve 26 has a partly threaded end portion 51 which extends from a flat sided, but otherwise cylindrical, end portion 52 having two opposed parallel flats 53. The threaded sleeve is generally of a cylindrical shape, the diameter of the threaded end portion being the same as the distance between the flats on the flat sided end portion. A threaded internal bore 54 passes axially through the threaded sleeve from one end to the other, penetrating both ends of the threaded sleeve. The threaded bore receives the shank 27 of the adjusting bolt 25, but the head 28 of the adjusting bolt fits inside the counterbore 43 of the second jaw member 12. The diameter of the head is larger than the width of the second jaw member so that part of the head protrudes from the counterbore in the nature of a thumb wheel having a knurled outer

-10-

circumferential face. Tangential engagement of the head permits the adjusting bolt to be turned about its axis within the threaded bore of the threaded sleeve to move the adjusting bolt axially to adjust the length of the combination of the threaded sleeve and adjusting bolt, the head being captured in the counterbore by the base 47 of the counterbore and the cover plate 46, constraining the second jaw member to move towards or away from the first jaw member with the axial movement of the adjusting bolt into and out of the threaded sleeve. The retaining pin 32 is retained in the retaining pin socket 33 in the first jaw member, the threaded sleeve 26 being retained by threaded engagement in a diametral opening 56 penetrating the retaining pin diametrically, but is a blind opening, stopping just short of penetrating the opposite side. The flats on the flat sided end portion 52 permit the threaded sleeve to be tightened with a tool, such as spanner or adjustable wrench, into the diametral opening on the retaining pin.

The handle 13 illustrated in Fig. 9 has a handle shank 61 and a handle grip 62 together making up the bulk of the length of the handle. On the end of the handle shank remote from the handle grip, there is provided an annular handle pivot lug 64 having a handle pivot aperture 63 penetrating sideways therethrough and an annular section matching the pivot lugs 37 on the first jaw member 11. The width of the handle pivot lug is such as to give a clearance fit between the two pivot lugs 37 in the slot 38 so that a pivot pin 31 (shown in Figs. 1 to 4) can be inserted through the two pivot pin apertures and the handle pin aperture for pivotal connection of the handle to the first jaw member. The cam 21 is provided on the lower side of the handle protruding from the handle shank and having an inner face

-11-

65 and an outer face 66, both of which are curved, the inner face of the cam being duplicated on each side of the handle pivot lug, but the outer face being continued on the underside of the handle pivot lug. The curvature of the inner face substantially matches the circumferential curvature of the handle pivot lug and the two pivot lugs on the first jaw member and the outer face has a curvature of larger diameter than the inner face.

Referring to Figs. 10 and 11, the wrench may be used to grasp or grip an article 80 between the first and second jaw members, the tightness of the grip being increased by moving the handle in the direction of arrow 84 which at the same time induces a torque about the axis of the article in direction of arrow 82 and forces the curved surface of the cam harder against the bearing surface. To enhance the tightening of the gripping force, a counter-acting force may be applied to the pivoting end of the handle in the direction of arrow 83. It will be seen that releasing of the grip is achieved by moving the handle in the reverse direction, there being no substantial force to overcome in releasing the jaws from the article.

Referring to Figs. 1 to 4, and to Figs. 10 and 11, it can be seen that by screwing the adjusting bolt 25 into the threaded sleeve 26, the first and second jaw members can be drawn together, with action of the handle tightening the grip on a small diameter article 26 having a diameter represented by dimension arrows 87.

By turning the adjusting bolt so that it is screwed outward from the threaded sleeve, the first and second jaw members can be widened to grip a large diameter article 88 having a large diameter represented by dimension arrows 89. Moving the handle in the direction of the arrow 84 not only causes a tightening of

-12-

the grip of the jaws on the articles, but also imparts a torque in the direction of the arrow 82 in a similar fashion to that described in respect of Figs. 1 and 2 above.

In each instance, the cam 21 may be inserted between the body portions of each jaw members by pivoting of the handle with respect to the first jaw member, the separating force caused by the outer face of the cam bearing on the bearing surface being accommodated by the head of the adjusting bolt bearing down upon the base of the counterbore, placing the adjusting bolt in tension with respect to the threaded sleeve, the tension in the threaded sleeve being taken up by the retaining pin 32. It will be seen that the wrench of the present invention uses a double lever principle, one lever being the jaw members acting in concert with the connecting means, the load for the lever being the gripping force applied to the article being gripped by the jaw members, the fulcrum being the connecting means restraining the jaw members from moving further apart than the adjusted length of the setting of the adjusting bolt, and the activation of the lever being performed by the action of the cam on the bearing surface. The second lever is the handle in its pivoting relationship with the first jaw member and the wedging action of the cam on the second jaw member, the load being the separating action of the cam on the bearing surface, the fulcrum being the pivoting connection between the handle and the first jaw member, and the activation of the lever being performed by the pivoting of the handle as hereinbefore described.

In the case of the two handle wrench, the length adjustable bolt assembly may be adjusted so that moving the handles together until the mating surfaces of the limiting lands meet. If the article to be gripped is larger than the adjusted separation of

-13-

the jaw members when the mating surfaces meet, imparting a force on the first handle as described in relation to the one handle wrench will impart a torque on the article being gripped. However, if desired, a reverse torque may be applied to the article being gripped, the tightening of the jaws onto the article being achieved by closing the handles together.

Although the invention has been described with reference to particular examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms within the broad scope and ambit of the invention as defined by the following claims.

-14-

CLAIMS

1. A wrench including:

first and second jaw members each having first and second gripping portions for gripping an article to be rotated about a work axis and a leverage portion spaced from said gripping portion;

a handle connected to the leverage portion of the first jaw member for pivoting movement relative thereto about a leverage axis parallel to said work axis;

engagement means on said handle or operatively connected to said handle for movement therewith for engagement with the leverage portion of said second jaw member for urging said first and second leverage portions apart, and

connecting means connecting said first and second jaw members and holding them in opposed disposition, said connecting means being operatively interposed between said respective opposed gripping portions and said opposed leverage portions and being arranged to allow pivoting of one of said jaw members relative to the other, the connecting means being adjustable to vary the distance between the gripping portions to suit different sized articles.

2. A wrench including:

first and second jaw members each having first and second gripping portions for gripping an article to be rotated about a work axis and a leverage portion spaced from said gripping portion;

a handle connected to the leverage portion of the first jaw member for pivoting movement relative thereto about a leverage axis parallel to said work axis;

engagement means on said handle or operatively connected to said handle for movement therewith for engagement with the

-15-

leverage portion of said second jaw member for urging said first and second leverage portions apart;

another handle in fixed relationship to and extending from the leverage portion of the second jaw member, and

5 connecting means connecting said first and second jaw members and holding them in opposed disposition, the connecting means being operatively interposed between said respective opposed gripping portions and said opposed leverage portions and being arranged to allow pivoting of one of said jaw members against the other, the connecting means being adjustable in length to vary the distance between the gripping portions to suit different sized articles.

3. A wrench according to Claim 2, wherein the handles are located in the plane of rotation about the work axis.

4. A wrench according to Claim 2 or Claim 3, wherein the handles are arranged in operative juxtaposition with each other for gripping of both handles by one hand of a user.

20 5. A wrench according to any one of Claims 2 to 4, wherein the handle pivotally attached to the first jaw member may be pivoted towards the other handle to tighten the grip of the gripping portions and away from the other handle to loosen the grip of the
25 gripping portions.

6. A wrench according to any one of the preceding claims, wherein the connecting means is in pivotal engagement with at least one jaw member.

30 7. A wrench according to any one of the preceding claims, wherein the connecting means is length adjustable.

-16-

8. A wrench according to any one of the preceding claims, wherein the connecting means is in the form of a length adjustable nut and bolt assembly.

5 9. A wrench according to Claim 8, wherein the nut is in the form of a cylindrical pin having a diametral bore for receiving a length adjustable bolt comprising a sleeve and a screw in threaded engagement with a threaded bore extending axially into the sleeve.

10. A wrench according to Claim 8 or Claim 9, wherein the nut and bolt assembly is pivotally connected to the first jaw member and the second jaw member includes a passage for accommodating the length adjustable bolt, and permitting relative, but limited, pivoting movement of the length adjustable bolt within the passage.

11. A wrench according to Claim 10, wherein the passage is formed as a tapered bore tapering outwardly towards the first jaw member.

12. A wrench according to any one of Claims 9 to 11, wherein the screw has a head held captive in a head retaining cavity provided in the second jaw member, and some of the perimeter of the head is exposed on one or both sides of the second jaw member for turning in a similar fashion to a thumb wheel.

13. A wrench according to any one of the preceding claims, and including biasing means operatively connecting the jaw members for biasing the jaw members towards one another.

14. A wrench according to any one of the preceding claims, wherein the engagement means includes a cam in fixed relationship

-17-

with the handle and co-operable with an abutment surface on the leverage portion of the second jaw member for urging the leverage portions apart.

5 15. A wrench according to Claim 14, wherein the cam is located close to the handle's pivotal connection to the first jaw member and is wedge shaped along a curved axis to provide an inner curved face which is coaxial with the leverage axis.

10 16. A component for a wrench as claimed in any one of Claims 1 to 15.

15 17. A wrench substantially as hereinbefore described with reference to Figs. 1, 2, and 5 to 11.

18. A wrench substantially as hereinbefore described with reference to Figs. 3, 4, and 5 to 9.

20 19. A wrench substantially as hereinbefore described with reference to any one of Figs. 1 to 11.

20. A component for a wrench substantially as hereinbefore described with reference to any one of Figs. 1 to 11.

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International Bureau



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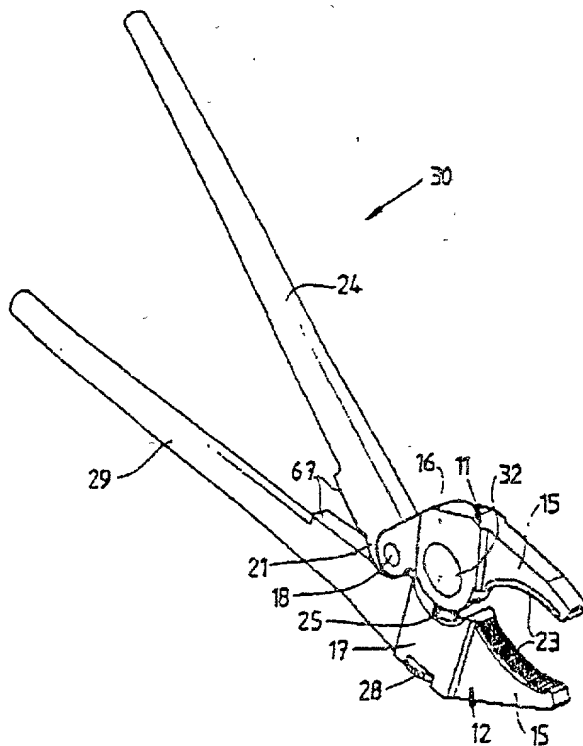
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- (71) Applicant and
- (72) Inventor: PETTS, Andax [AU/AU]; 37 Tulloch Street, Planlands, QLD 4740 (AU).
- (74) Agent: AHEARN FOX; GPO Box 1149, Brisbane, QLD 4001 (AU).
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(54) Title: WRENCH



(57) Abstract: A wrench (10) including first (11) and second (12) jaw members each having first and second gripping portions (23) for gripping an article to be rotated about a work axis and a leverage portion spaced from the gripping portion; one or two handles, the one handle (13) being connected to the leverage portion of the first jaw member for pivoting movement relative thereto about a leverage axis parallel to the work axis and the other handle (29) (where provided) extending from the leverage portion of the second jaw member in the plane of rotation of the first handle; engagement means on the handle for movement therewith for engagement with the leverage portion of the second jaw member to urge the first and second leverage portion apart, and connecting means (14) connecting the first and second jaw members and holding them in opposed disposition, the connecting means being operatively interposed between the respective opposed gripping portions and the opposed leverage portions and being arranged to allow pivoting of the jaw members with respect to each other, the connecting means being adjustable in length to vary the distance between the gripping portions to suit different sized articles. Preferably, the connecting means is in pivotal engagement with at least one jaw member, the connecting means is in the form of a length adjustable nut and bolt assembly, the nut being in the form of a cylindrical pin having a diametral bore for receiving a length adjustable bolt comprising a sleeve (26) and a screw (27) in threaded engagement with a threaded bore extending axially into the sleeve.

WO 01/23146 A1

1/6

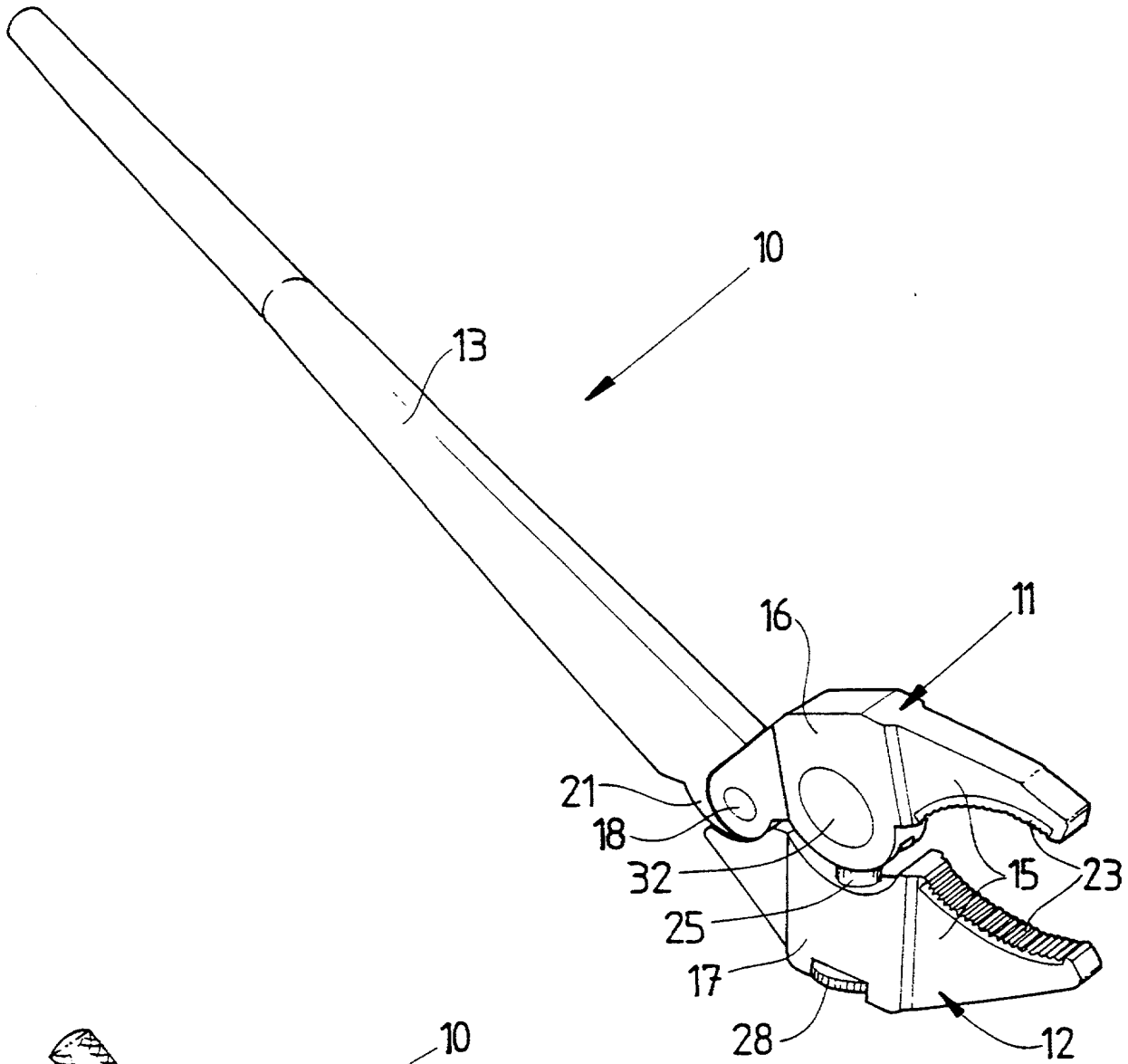


FIG. 1

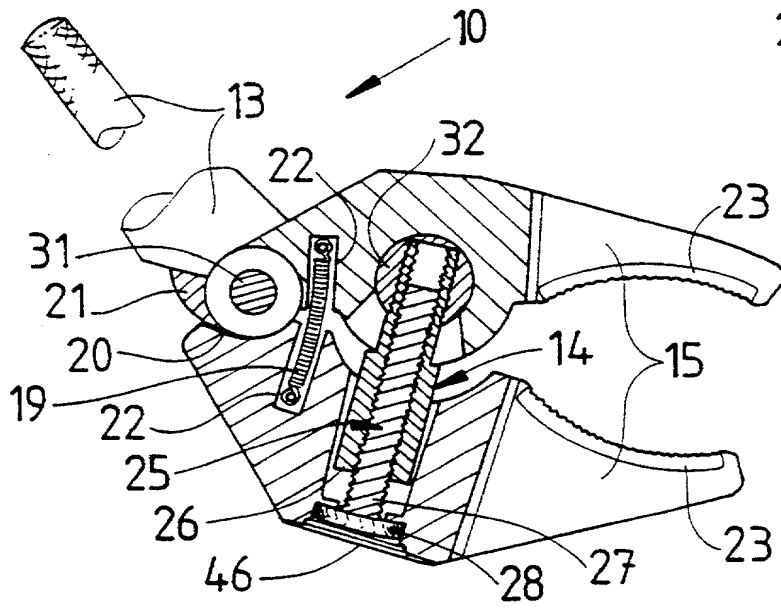


FIG. 2

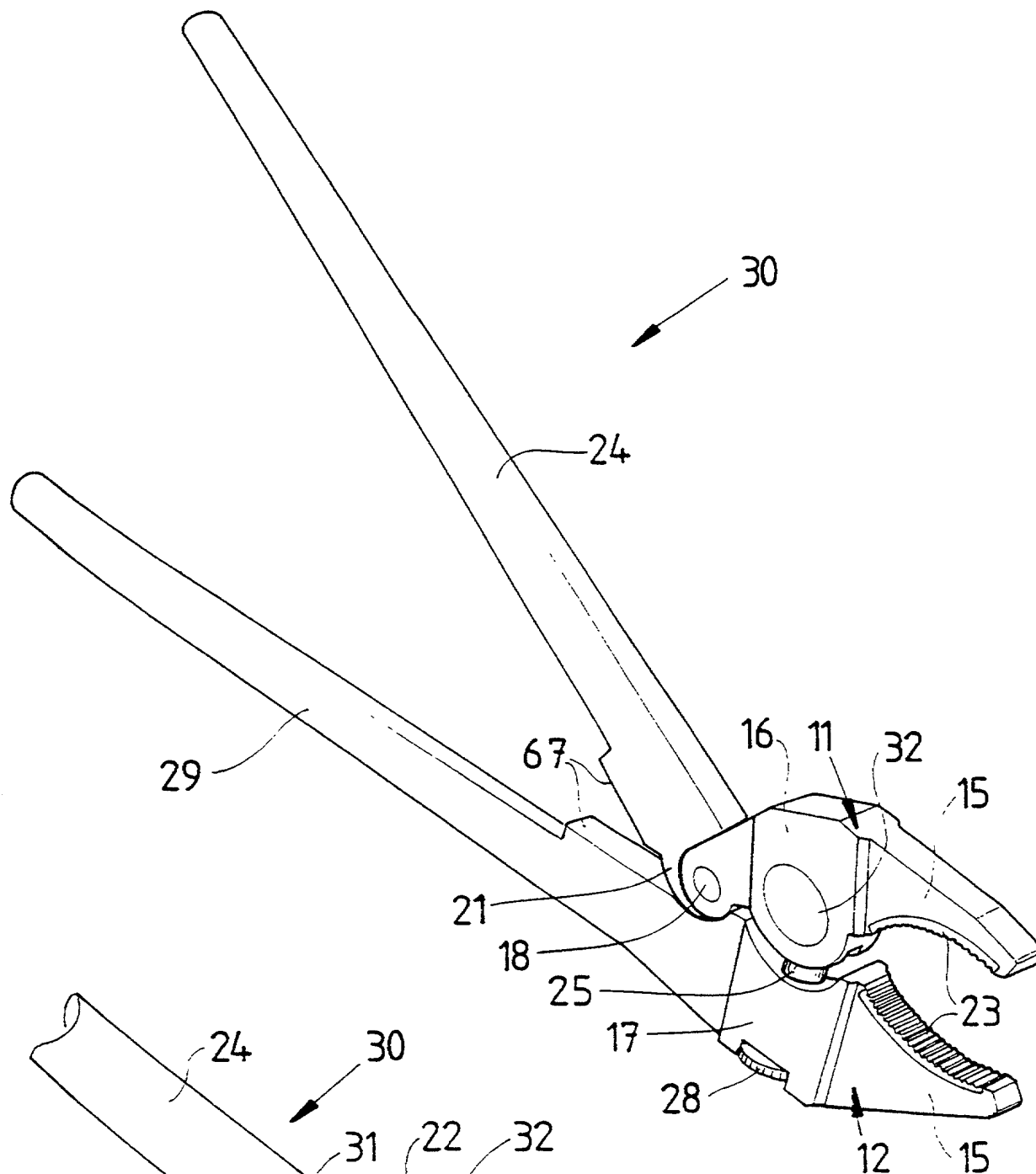


FIG. 3

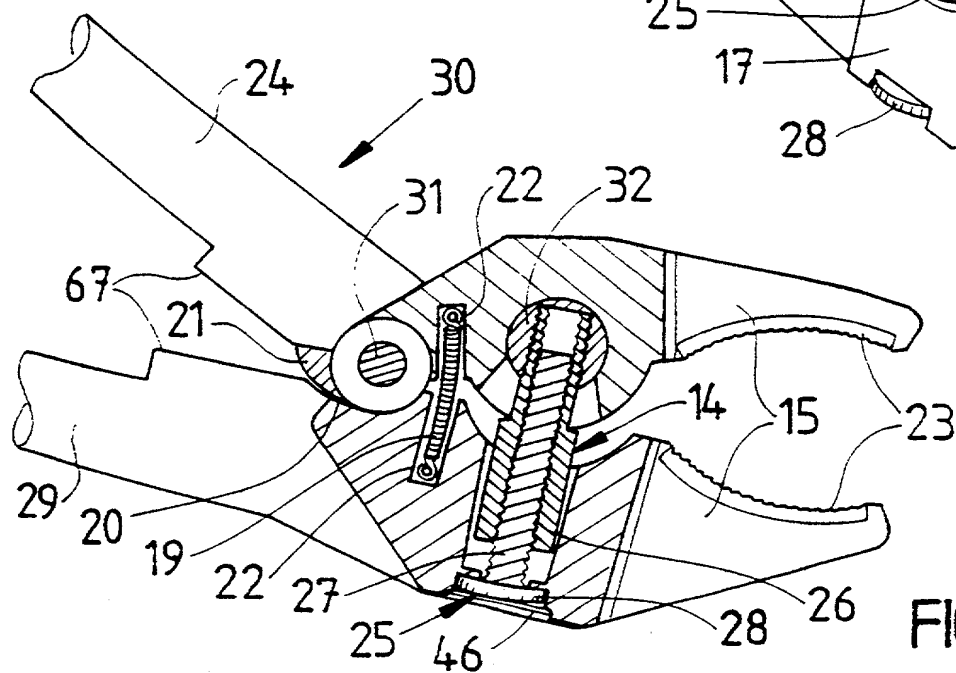


FIG. 4

3/6

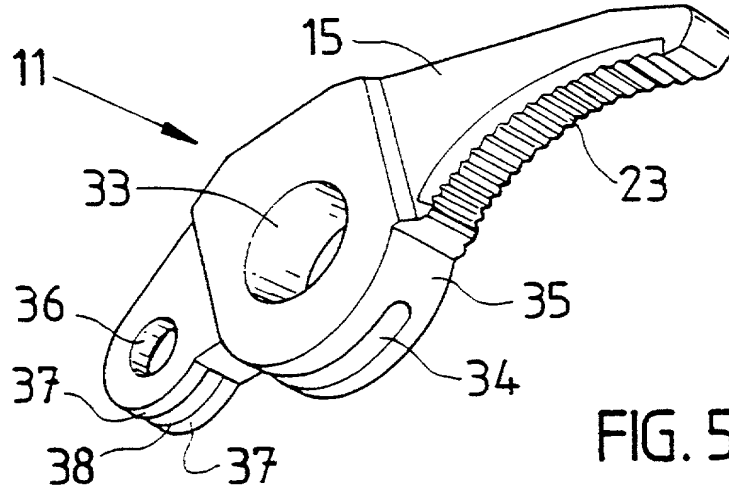


FIG. 5

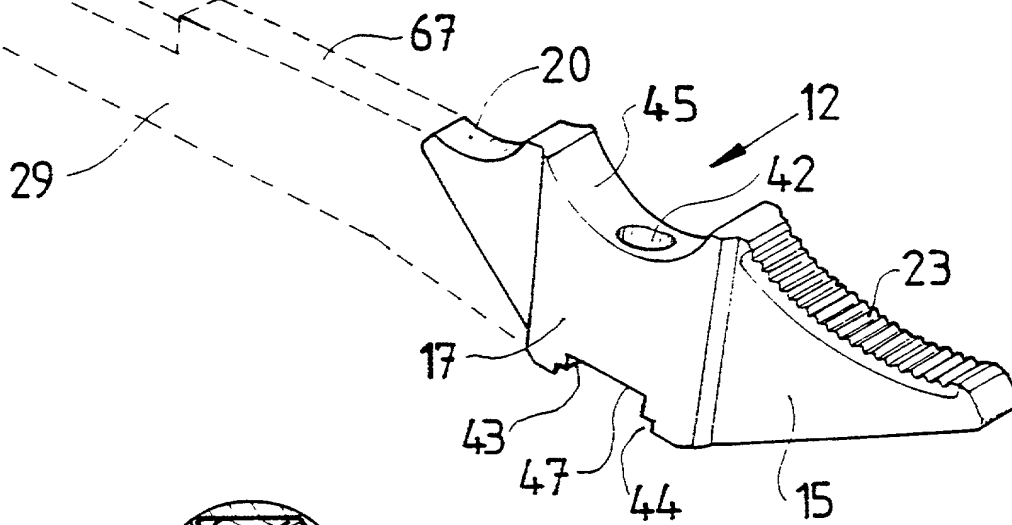


FIG. 6

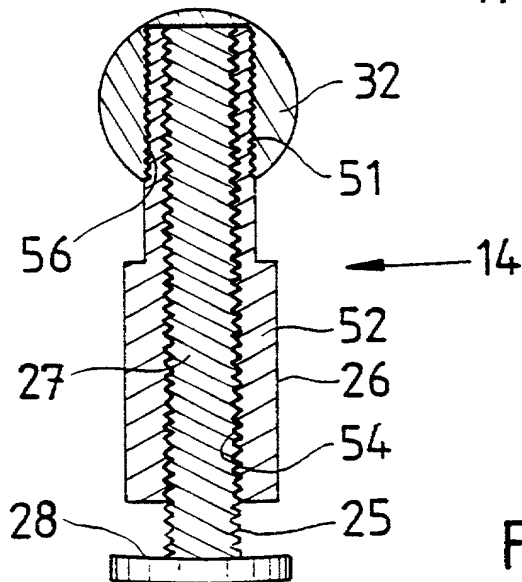


FIG. 7

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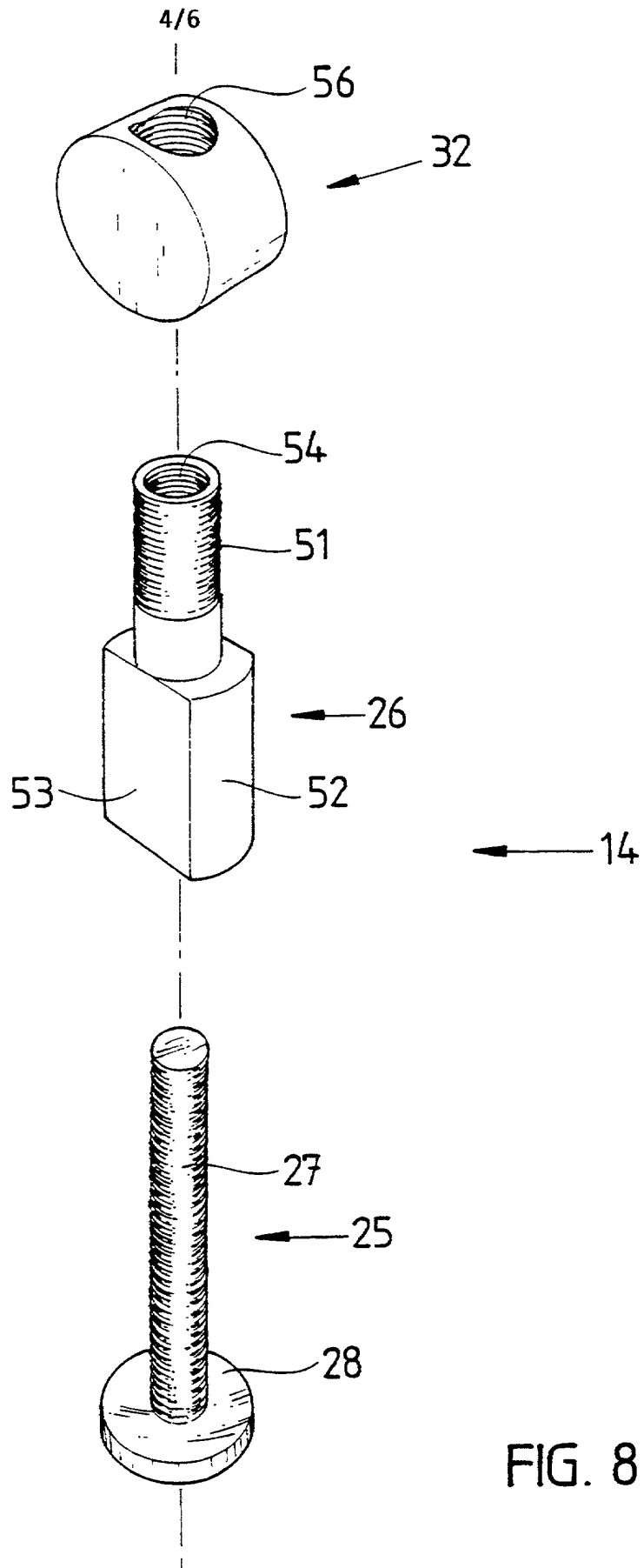


FIG. 8

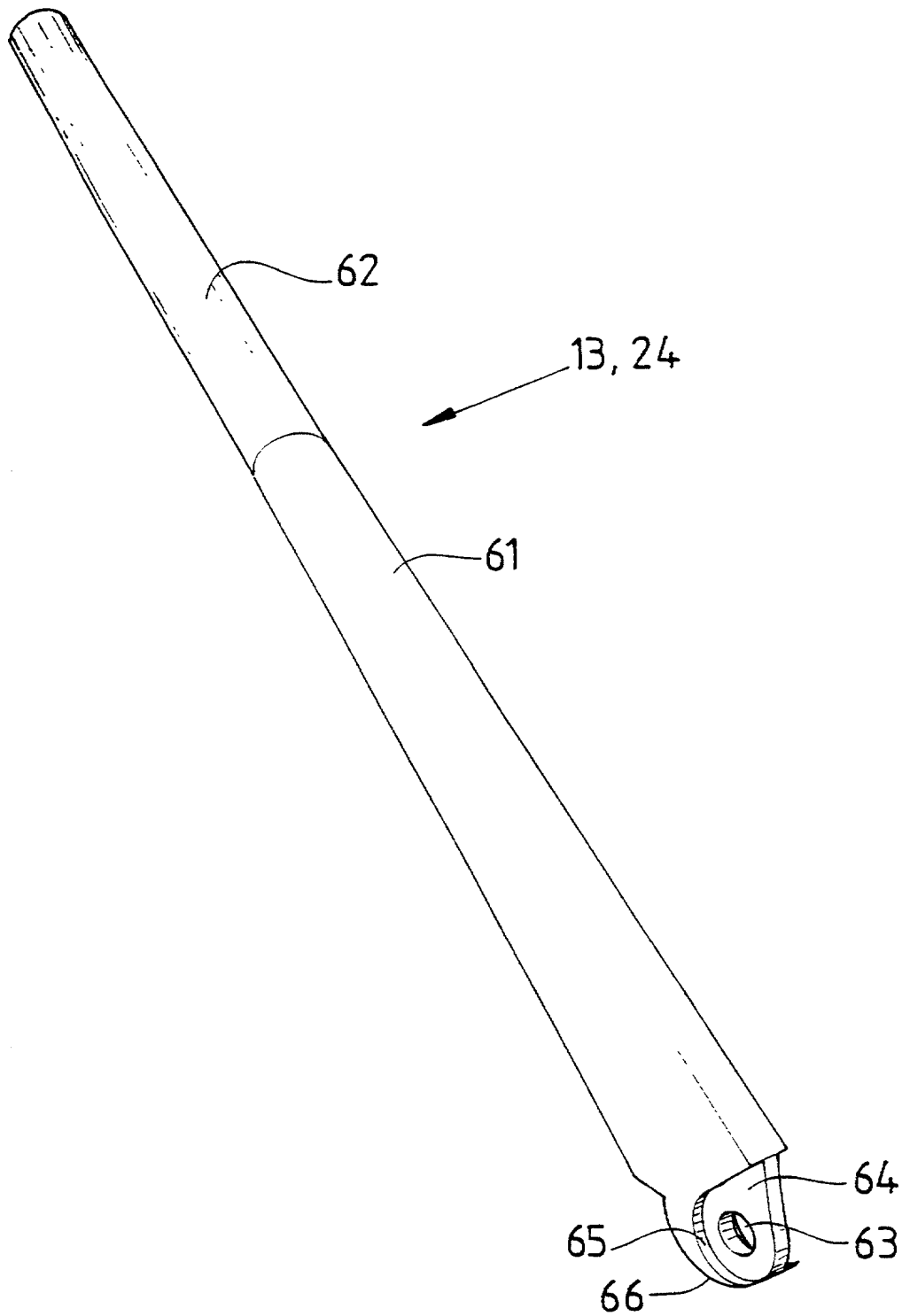


FIG. 9

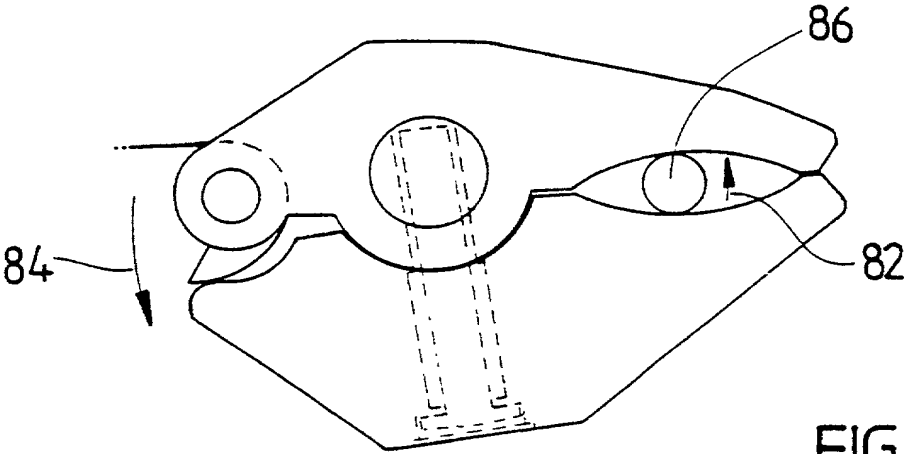


FIG. 10

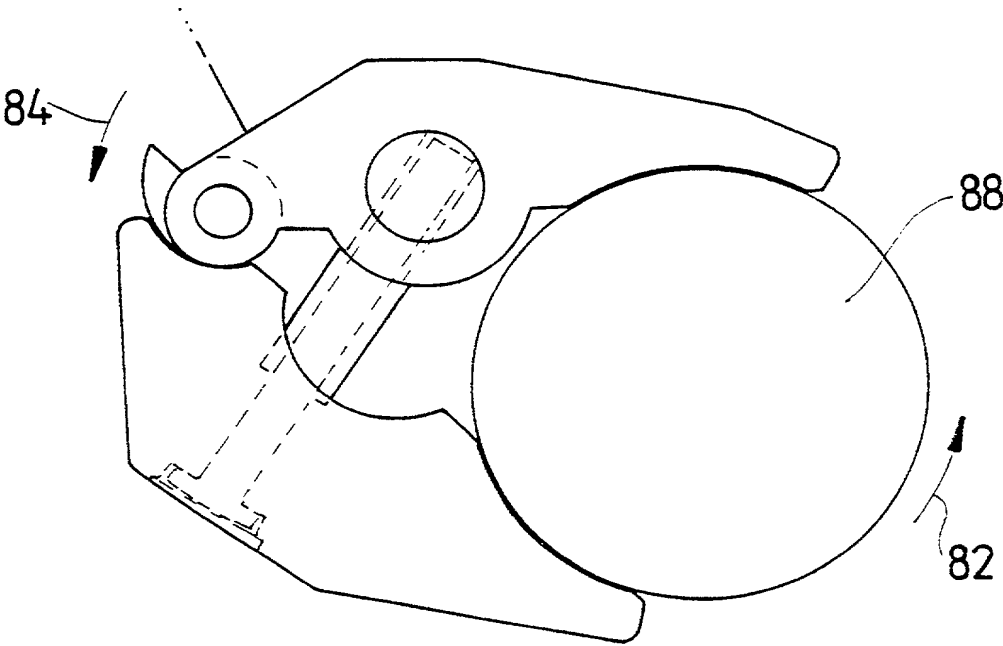


FIG. 11

UNITED STATES

PATENT APPLICATION DECLARATION AND POWER OF ATTORNEY - ORIGINAL APPLICATION

ATTORNEY'S
DOCKET NO. 205, 576

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name:

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention entitled

(1) "WRENCH"

(1) TITLE OF
INVENTION

the specification of which

(2) ☐ is attached hereto.

(2) CHECK
APPROPRIATE
BOX

☒ was filed on September 27, 2000 as Application No. PCT/AU00/01173
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above

I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application under 37 CFR 1.56(a); the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application; and

as to applications for patents or inventor's certificate on the invention filed in any country foreign to the United States prior to this application by me or my legal representatives or assigns,

(3) ☐ no such applications have been filed, or

(3) CHECK
APPROPRIATE
BOX

☒ such application have been filed as follows:

EARLIEST FOREIGN APPLICATION(S), IF ANY, FILED WITHIN 12 MONTHS PRIOR TO THIS APPLICATION				
Country	Application Number	Date of Filing (day, month, year)	Date of Issue (day, month, year)	Priority Claimed Under 35 USC 119
(4) Australia	PQ 3166	28 September 1999		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
International	PCT/AU00/01173	27 September 2000		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
ALL FOREIGN APPLICATIONS, IF ANY, FILED MORE THAN 12 MONTHS PRIOR TO THIS APPLICATION				
(4)				

(4) COMPLETED
DATA
INDICATED IF
APPLICABLE

I hereby claim the benefit under Title 35, United States Code § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(5) _____
(Application Ser. No.) (Filing date) (Status: patented, pending, abandoned)

(5) COMPLETE
DATA
INDICATED IF
APPLICABLE

(5) _____
(Application Ser. No.) (Filing date) (Status: patented, pending, abandoned)

Power of Attorney: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Jeffrey A. Schwab, Registration Number 24,490
Stewart J. Fried, Registration Number 20,694
Jay S. Cinamon, Registration Number 24,156

Dennis A. Mason, Registration Number 19,571
Michael I. Markowitz, Registration Number 30,659
Thomas E. Spath, Registration Number 25,928

Send Correspondence To:
Abelman, Frayne & Schwab
150 East 42nd Street
New York, New York 10017-5612

Direct Telephone Calls To:
Jeffrey A. Schwab, Stewart J. Fried
Jay S. Cinamon, Dennis A. Mason,
Michael I. Markowitz or
Thomas E. Spath at (212) 949-9022

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of Sole or First Inventor: <u>Andax</u> <u>PETTS</u>		Inventor's Signature <i>At Petts</i>		Date <u>27-3-2002</u>
Residence: <u>Australia</u>			Citizenship: <u>Australian</u>	
Post Office Address <u>37 Tulloch Street, Planlands, Queensland 4740 Australia</u> <u>ALIX</u>				
Full Name of Second Joint Inventor, If Any		Inventor's Signature		Date
Residence			Citizenship	
Post Office Address				
Full Name of Third Joint Inventor, If Any		Inventor's Signature		Date
Residence			Citizenship	
Post Office Address				
Full Name of Fourth Joint Inventor, If Any		Inventor's Signature		Date
Residence			Citizenship	
Post Office Address				
Full Name of Fifth Joint Inventor, If Any		Inventor's Signature		Date
Residence			Citizenship	
Post Office Address				
Full Name of Sixth Joint Inventor, If Any		Inventor's Signature		Date
Residence			Citizenship	
Post Office Address				